

# PATENT ABSTRACTS OF JAPAN

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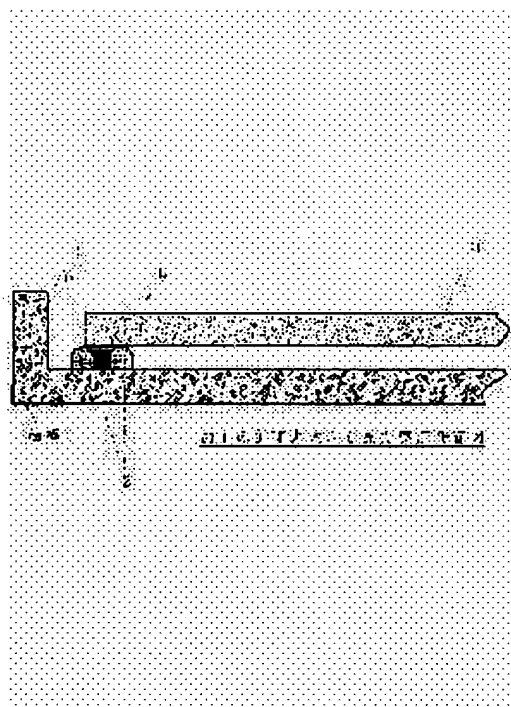
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## (54) PIEZOELECTRIC VIBRATOR

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a piezoelectric vibrator, wherein a piezoelectric raw plate is supported in a cantilever state inside a piezoelectric vibrator package and air-tightly shielded, which is contrived to horizontally support a piezoelectric vibrating plate resulting in eliminating a change in the characteristics such as a change in the main vibrating frequency caused by the piezoelectric vibrating plate in contact with the package and the cover thereby providing stable characteristics and excellent yield.

**SOLUTION:** In order to horizontally support the piezoelectric vibrating plate, a plurality of supports with the same height are provided, or a hole or a recess is provided to the center of the supports, a conductive adhesive is coated to the hole or the recess, the piezoelectric vibrating plate is pressed to the upper face of the supports by the contraction of the cured conductive adhesive to horizontally support the piezoelectric vibrating plate, thus the task is solved.



## LEGAL STATUS

[Date of request for examination]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The field of the technique in which invention belongs]

This invention relates to the structure of a piezoelectric transducer where two or more heights base materials or the heights base material which has a hole or a crevice at the core supports a piezo-electric diaphragm.

[0002]

[Description of the Prior Art]

Generally the piezoelectric transducer constitutes the supporting structure of the condition of a cantilevered suspension for the piezo-electric blank within the piezoelectric transducer container with the quartz resonator which divides and is most often used. This is because there is a possibility of the both ends of a piezo-electric blank being fixed, and the thermal stress and mechanical stress of an insulating substrate joining a piezo-electric diaphragm, and worsening properties, such as frequency characteristics, when a piezo-electric blank is supported in the state of both \*\*\*\* support on the conductive pad on the insulating substrate of a piezoelectric transducer.

[0003]

In recent years, the piezoelectric transducer is asked for the miniaturization of the appearance size in the very rapid container configuration with the miniaturization of the device used.

[0004]

[Patent reference 1]

JP,11-289238,A

[0005]

In addition, other than the advanced-technology reference specified by the above mentioned advanced-technology document information, as for the applicant, it did not come to discover the advanced-technology reference relevant to this invention till this application.

[0006]

[Problem(s) to be Solved by the Invention]

By the assembly activity becoming difficult, since the opposite edge of jointing of a piezo-electric blank contacted the internal loading substrate and internal lid of a piezoelectric transducer container, the piezoelectric transducer of cantilevered suspension structure changed from the frequency of a convention of properties, such as oscillation frequency of a piezoelectric transducer, consequently there was a fault of reducing the yield of a piezoelectric transducer sharply as it progressed, when the demand of a miniaturization of a piezoelectric transducer progressed.

[0007]

Although approaches, such as preparing the bump of various configurations on the conductive pad on the insulating substrate inside a piezoelectric transducer, accomplished in order to prevent that the opposite edge of jointing of a piezo-electric blank contacts the internal loading substrate and internal lid of a piezoelectric transducer container Especially the thing for which the float from the insulating-

substrate side of the opposite edge by the side of adhesion of a piezo-electric blank is uniformly held in a series of processes of hardening of loading of spreading of electroconductive glue - a piezo-electric blank - electroconductive glue was very difficult among the production processes of a piezoelectric transducer. If only electroconductive glue is used for this reason and it carries a piezo-electric blank on the pad with which the bump who becomes the supporting point which floats a flat conductive pad or a piezo-electric blank was prepared According to the conditions of the location in which the location of spreading of electroconductive glue, the amount of spreading of electroconductive glue, and a piezo-electric blank are carried It is because the piezo-electric blank in which the force which pulls the piezo-electric blank by electroconductive glue carried becomes less fixed therefore, and was carried may have an inclination and may contact the internal loading substrate and internal lid of a piezoelectric transducer container. The force in which this electroconductive glue pulls a piezo-electric blank is based on the shrinkage force of the electroconductive glue at the time of hardening of electroconductive glue.

[0008]

Although how to harden electroconductive glue on a flat conductive pad can be considered fixing the location of the piezo-electric blank to carry to one method of holding the float from the insulating-substrate side of the opposite edge of a piezo-electric blank where electroconductive glue is applied here using a jig The container of the piezoelectric transducer with which a piezo-electric blank is contained complicates the production process by the very small thing, setup of the jig to such very small containers, etc., and serves as cost quantity as a result, and the operation is difficult for the present condition.

[0009]

moreover, in order to advance low back-ization of a piezoelectric transducer further further, a bump top face never turn into a flat surface like drawing 6 in structure drawing idea \*\*\*\* which support the piezo-electric blank which prepare the bump of various configurations, use the bump as the supporting point and carry her on a conductive pad at a piezoelectric transducer, but since the core be surely rise and curve, a piezo-electric diaphragm cannot be keep level, but a possibility of collide with a container base and a lid come out.

Moreover, although there is an approach which changes the height of the bump in JP,11-289238,A of the advanced technology, and an insulating substrate and the Xtal diaphragm collide and carry out, since a lid will be hit if it is difficult to adjust few bump height and too high, an advanced precision is required.

Drawing 6 is the fragmentary sectional view of the example which used one Bengbu with the conventional technique, and since the top face of Bengbu 20 is curving even if it installs Bengbu 20 and lays the piezo-electric diaphragm 3 on a container 1, the horizontal position of a piezo-electric diaphragm cannot become settled easily.

[0010]

[Means for Solving the Problem]

In order to solve these technical problems, this invention solves a header and a technical problem for the structure which can keep the Xtal diaphragm level, even if the top-face front face of a base material is curving.

[0011]

In order to solve this technical problem, in this invention, the piezo-electric diaphragm is made into the structure where the edge of this piezo-electric diaphragm is laid on the heights base material of two or more same height, and is supported, in the piezoelectric transducer fixed to the base material inside a container with electric conduction adhesives.

Moreover, in the piezoelectric transducer currently fixed to the supporter inside a piezo-electric diaphragm container with electric conduction adhesives, this piezo-electric diaphragm makes the edge the structure which is laid on the heights base material which has a hole or a crevice at the core, and is supported.

[0012]

[The gestalt of operation of this invention]

the drawing of the following and attachment -- \*\* -- \*\*\*\* -- the example of this invention is explained. In addition, the same sign in each drawing shall show the same object.

[0013]

Drawing 1 is the fragmentary sectional view showing the structure inside the piezoelectric transducer of this invention. In this example, two or more four four-piece heights base materials 2 are being fixed to the insulating container 1 by the container base. In the case of the same ingredient as a metal or a container insulator, metallizing processing of the heights base material 3 is carried out in the front face. Or you may form only from a metallized layer. Or metallizing may be carried out to an insulator. Each base material has two or more heights base materials 2, although the heights top face is rising round, if the height has gathered mostly, since the piezo-electric diaphragm 3 is pushed against a base material, it is arranged with the top-most vertices, and a piezo-electric diaphragm can keep it level.

[0014]

Drawing 2 is the important section of drawing 1, and has applied electroconductive glue 4 among two or more base materials 2. Since height has gathered, the piezo-electric diaphragm 3 can be maintained horizontally and especially the electroconductive glue 5 is applied among two or more base materials 2 even if the top face of the piece piece of the heights base material 2 is not necessarily even. When electroconductive glue 5 hardens, the effectiveness which pulls a piezo-electric diaphragm downward will be produced, and the piezo-electric diaphragm 3 will double with the top-most vertices of two or more heights base materials 2, consequently a piezo-electric diaphragm will be maintained horizontally. In addition, in drawing 1 and drawing 2, the electrode of a piezo-electric diaphragm, the drawer electrode, the electrode of a container, etc. are omitted. Finally a hermetic seal is carried out to a container with a lid 4, and it becomes a piezoelectric transducer.

Although it will do this application effectiveness so in this example if there is, although the two or more number of base materials shows the example of four one side, three or more pieces are desirable.

[0015]

Although drawing 3 is the enlarged drawing of the base material used for drawing 1 and drawing 2 and the top face of each heights base material is desirable in it being a flat surface, even if it is not necessarily a flat surface, if height has gathered, a piezo-electric diaphragm can be held horizontally. The same above-mentioned effectiveness is realizable with the heights base material of drawing 4. Although drawing 4 makes integral construction two or more heights base materials, the part in contact with a piezo-electric diaphragm is divided into plurality. Thus, two or more heights base materials of the invention in this application mean the part which touches a piezo-electric diaphragm, and the same effectiveness is done so even if it unifies two or more heights base materials like drawing 4.

[0016]

Drawing 5 shows other examples and shows the example of one base material. It may not necessarily be even, the top face of a heights base material rises from the first, and this heights base material can do the top-most vertices of heights, especially although metallizing was carried out, it will become a case and it will curve at the shape of a convex. However, the hole or the crevice 7 is formed in the core of this heights base material 6. If a hole or the periphery section of a crevice 7 is keeping it almost level even if the top face of a heights base material is curving, when there is a hole or a crevice 7, a horizontal can be maintained even if it lays a piezo-electric diaphragm. Like the case of drawing 2, by applying electroconductive glue into the shape of a hole or a crevice, since electric conduction adhesives contract with hardening, a piezo-electric diaphragm is pulled in the direction of a container base, it is dependent on the height of the periphery section of a heights base material, and a piezo-electric diaphragm is maintained almost horizontally.

[0017]

It can use, even if it is the others, the ceramic, and other piezo electric crystals which used Xtal as a piezoelectric transducer of the invention in this application. [ quartz resonator ]

[0018]

[Effect of the Invention]

When there are two or more base materials or the lead was taken with one heights base material in the

hole or the crevice even if the heights base material top face was curving by the shape of heights in order for this invention to have held the piezo-electric diaphragm horizontally, it turned out that a piezo-electric diaphragm can be maintained at a level posture.

By support, at the time of formation of a conductive pad, since the rectangle-like projection with one pair of narrow width of face is only formed by the multilayer conductive metallized layer by general screen-stencil Since maintenance of the levelness of the piezo-electric blank after electroconductive glue hardening is obtained by this invention, without adding the process which is added to the production process of the piezoelectric transducer which does not need complicated structure and usually comes out, The comprehensive yield of the finished product was able to be sharply raised as the whole piezoelectric transducer, pressing down a manufacturing cost cheaply.

Moreover, also in the piezo oscillator which constitutes the piezoelectric transducer of not only a piezoelectric transducer simple substance that is in this example but this invention, the effectiveness described previously similarly that change of properties, such as oscillation frequency, was lost was acquired, consequently the improvement of the comprehensive yield of a piezo oscillator was able to be realized.

[Brief Description of the Drawings]

[Drawing 1] It is the fragmentary sectional view showing the internal structure of the piezoelectric transducer in which the example of this invention is shown.

[Drawing 2] The fragmentary sectional view when seeing the example of drawing 1 from width is shown.

[Drawing 3] It is the enlarged drawing of the base material in which the example of this invention is shown.

[Drawing 4] It is the enlarged drawing of the base material in which other examples of this invention are shown.

[Drawing 5] It is the enlarged drawing of the base material in which other examples of this invention are shown.

[Drawing 6] The fragmentary sectional view showing the conventional base material is shown.

[Description of Notations]

1 Container

2 Six Base material

3 Piezo-electric Diaphragm

4 Electroconductive Glue

7 Hole or Crevice

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CLAIMS

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[Claim(s)]

[Claim 1]

The piezoelectric transducer characterized by laying the edge of this piezo-electric diaphragm on two or more heights base materials with the same height, and supporting it in the piezoelectric transducer fixed to the base material inside a container with electric conduction adhesives in the piezo-electric diaphragm.

[Claim 2]

The piezoelectric transducer according to claim 1 characterized by having applied electric conduction adhesives among [ each ] two or more heights base materials with this same height, and having fixed the piezo-electric diaphragm.

[Claim 3]

The piezoelectric transducer characterized by laying the edge of this piezo-electric diaphragm on the heights base material which has a hole or a crevice at the core, and supporting it in the piezoelectric transducer currently fixed to the supporter inside a piezo-electric diaphragm container with electric conduction adhesives.

[Claim 4]

The piezoelectric transducer according to claim 3 characterized by having applied electric conduction adhesives to the central hole or central crevice of this heights base material, and having fixed the piezo-electric diaphragm.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

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[Drawing 2] The fragmentary sectional view when seeing the example of drawing 1 from width is shown.

[Drawing 3] It is the enlarged drawing of the base material in which the example of this invention is shown.

[Drawing 4] It is the enlarged drawing of the base material in which other examples of this invention are shown.

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[Description of Notations]

- 1 Container
- 2 Six Base material
- 3 Piezo-electric Diaphragm
- 4 Electroconductive Glue
- 7 Hole or Crevice

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[Translation done.]



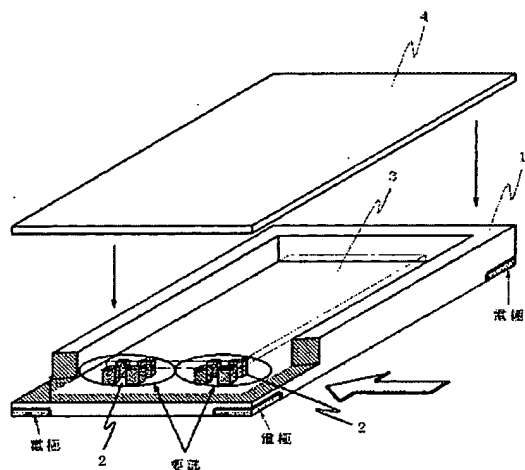
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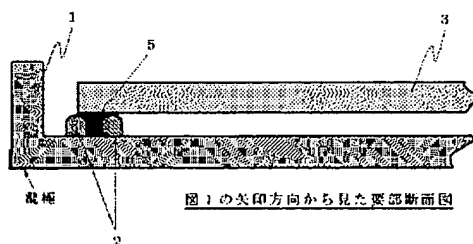
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## DRAWINGS

[Drawing 1]



[Drawing 2]



[Drawing 3]

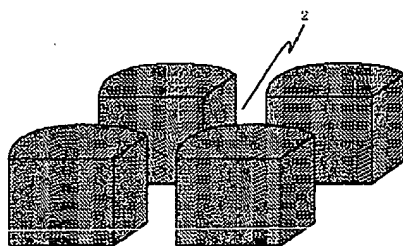
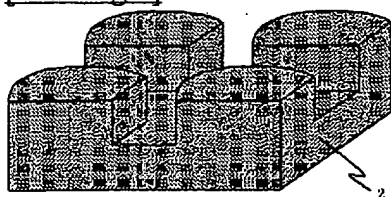


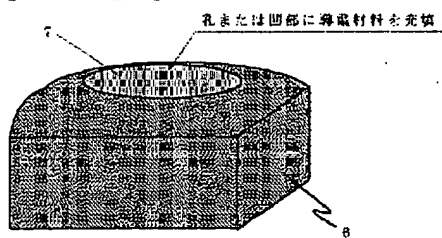
図1の要部拡大図（実施例1）

[Drawing 4]



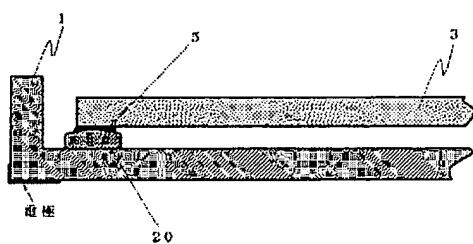
局部拡大図（実施例 2）

[Drawing 5]



局部拡大図（実施例 3）

[Drawing 6]



[Translation done.]